3/5/18 "Too many of us are not living our dreams because we are living our fears."-Les Brown

HW: "Related Rates" packet page 11 Sphere #1
Test 2 on Friday 3/9

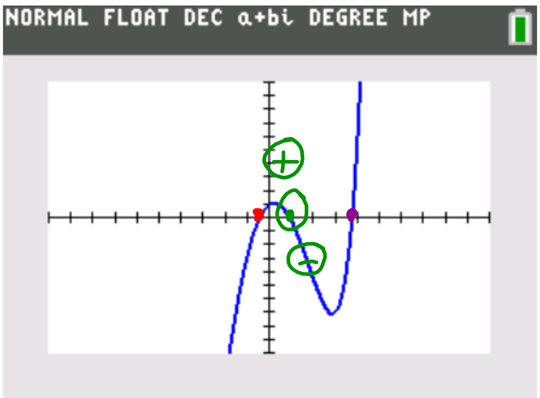
AIM: Related Rates cont.

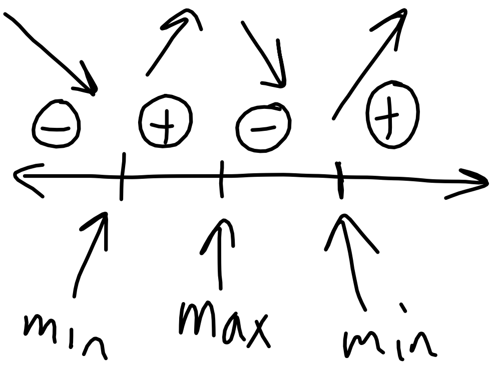
Warm Up:

If the derivative of f is given by $f'(x) = e^x - 3x^2$, at which of the following values of x does f have a relative maximum value?

Derivative = 0

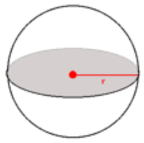
(A) -0.46 (B) 0.20 (C) 0.91 (D) 0.95 (E) 3.73





Page 3

Sphere

	The **volume** of a sphere is given by the equation: $V = \frac{4}{3}\pi r^3$	The **surface area** of a sphere is given by the equation: $S = 4\pi r^2$

Question: A spherical snowball with an outer layer of ice melts so that the *volume* of the snowball decreases at a rate of 2 cm^3/min.

(a) How *fast is the radius changing* when diameter of the snowball is 10 cm?

$r = 5cm$

1. Given Information:

$$\frac{dV}{dt} = -2\,cm^3/min$$

$$r = 5cm$$

2. Looking for:

$$\frac{dr}{dt}$$

3. Equation:

$$V = \frac{4}{3}\pi r^3$$

$$\frac{dV}{dt} = 4\pi r^2 \frac{dr}{dt}$$

4.

$$-2 = 4\pi(5)^2 \frac{dr}{dt}$$

$$-2 = 100\pi \frac{dr}{dt}$$

$$\frac{-2}{100\pi} = \frac{dr}{dt}$$

$$\frac{-1}{50\pi}\frac{cm}{min} = \frac{dr}{dt}$$

Radius changes @ $-\frac{1}{50\pi}$ cm/min

(b) How fast is **surface area** of the snowball *decreasing* at this time?

1. Given Information

$r = 5cm$

$\frac{dr}{dt} = -\frac{1}{50\pi}$

2. Looking for:

$$\frac{dS}{dt}$$

3. Equation:

$$S = 4\pi r^2$$

$$\frac{dS}{dt} = 8\pi r \frac{dr}{dt}$$

4.

$$\frac{dS}{dt} = 8\cancel{\pi}(5)\left(\frac{-1}{50\cancel{\pi}}\right)$$

$$\frac{dS}{dt} = \frac{-40}{50} = \frac{-4}{5} = -.8\ \frac{cm^2}{min}$$

Decreasing @ $.8\,cm^2/min$